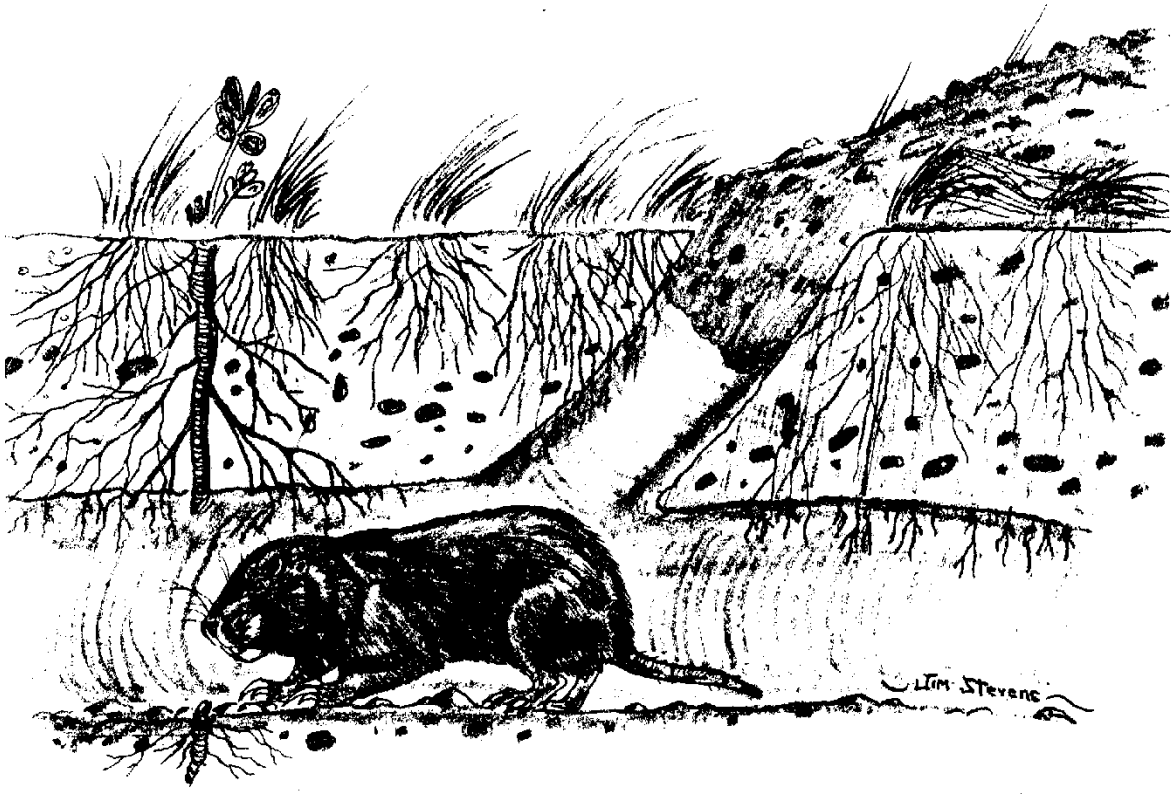
POCKET GOPHER CONTROL TECHNIQUES



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POCKET GOPHERS
THEIR BIOLOGY AND CONTROL

BIOLOGY

Pocket gophers get their name from the large, fur-lined cheek pouches used to carry food. The continental U.S. hosts more than a dozen species of pocket gophers. But Montana only has one, the Northern pocket gopher (*Thomomys talpoides;* Fig. 1).

Fig. 1. A Northern pocket gopher.

Northern pocket gophers are small rodents 6½ to 10 inches in length (not counting the three-inch tail) and weighing only three to six ounces, with males slightly larger and heavier than females. Their strong forelegs have long claws suitable for digging burrows and pushing excavated soil. Like all rodents, pocket gophers have large incisors used to dig and cut roots and clip stems. Their lips close behind their incisors allowing them to gnaw and clip without ingesting soil. Pocket gophers are not blind. Their eyes are not well developed but are capable of seeing light. Their whiskers, along with their tail, help guide them as they move forward and backward in their dark tunnels. The fur of pocket gophers tends to match the color of the surrounding soil, thereby providing them with camouflage. Despite their subterranean existence, their fur is remarkably clean.

Pocket gophers are rarely seen because they spend almost 95 percent of their time below ground in complex burrow systems up to 800 feet in length. Pocket gophers create three types of tunnels. Deep tunnels, two to six feet deep, lead to dens and food storage chambers. Main tunnels, four to eight inches below the surface, are the highways for pocket gophers giving them access to food. Lateral tunnels lead from the main tunnel to the surface, typically at a 45° angle. Pocket gophers use lateral tunnels to dispose excavated soil from the main tunnel on the surface and to access the surface for foraging. Foraging activity also occurs in the main tunnel where pocket gophers gnaw on roots.

Pocket gophers expend enormous effort to create and maintain their burrow system. Pocket gophers can dig at a rate of three to four feet per hour depending on soil conditions. It is difficult to estimate the amount of soil moved by pocket gophers in a given year due to the number of variables involved. Nevertheless, researchers estimate the volume of their burrows to be at least 24 cubic feet and that a single pocket gopher can excavate 3½ cubic feet of soil to the surface per year. We know that pocket gophers move more soil than that because not all the soil is brought to the surface. Some is used to back fill tunnels as the pocket gopher creates new ones.

On the average a single pocket gopher occupies an area of about 2,000 square feet (0.05 acre). In ideal habitat, such as alfalfa, pocket gophers may number 30 or more per acre. In rangelands, pocket gophers number up to 15 per acre. Except during breeding and rearing of young, pocket gophers are solitary and territorial in nature. They seem to aggressively exclude other pocket gophers from their burrow system.

Pocket gophers are active year round and do not hibernate, but mound creation is highest during the spring and fall. Pocket gophers can feed on plants from their tunnels or forage on the soil surface. Pocket gophers will travel as far as 18 inches from the earth plug to clip plants. Pocket gophers are vulnerable to predation when on the surface, so they will take advantage of tall plant growth and snow to hide their surface travels. Snow tunnels are often filled with soil, forming winter soil casts rather than the mounds raised at other times of the year (Fig. 2).

Fig. 2. Soil caste created by a pocket gopher.

These snake-like casts are often seen on the ground surface in the spring after snow melt. Pocket gophers store food in underground caches to sustain them when fresh vegetation is scarce or when dry or frozen soil makes foraging difficult.

Pocket gophers are vegetarians that feed on bulbs, tubers, and plants with succulent tap roots such as those found in flower and vegetable gardens. In pasture and forage crops large rooted plants such as alfalfa and rhizomatous grasses are the preferred food. Grasses or other plants with fine-branched fibrous roots may comprise no more than 10 percent of a gopher's annual diet where fleshy rooted forbs are abundant.

Northern Pocket gophers can breed one to three times per year but in Montana they breed once (perhaps twice) between March and June. Mated females give birth to five to six young in about 20 days. Young are born sightless, hairless, and weigh about ½ ounce. The father does not participate in the rearing of young. Newborn pocket gophers become independent within 40 to 60 days. By mid to late summer, young dig their own tunnel off of the mother's or abandon their mother's burrow on a surface journey to find a location suitable to dig their own burrows. Young do not breed until the following spring.

Pocket gophers may be found anywhere in Montana where the soil is deep and dry enough to maintain intact burrows, is sufficiently free of rocks to permit digging, and is fertile enough to grow suitable plants, particularly tap-rooted plants. Pocket gophers tend to avoid sloped areas with a grade of more than 35° but prefer areas with slopes of 10° as well as soils with moisture levels below five percent or above 25 percent. While pocket gophers can severely damage newly planted forests, they tend to avoid established forests.

DAMAGE

Effective management of vertebrate pests requires accurate identification of the species causing the problem. The common use of the term "gopher" to refer to burrowing animals can lead to improper identifications and thereby use of improper control methods.

Look for the following signs to confirm the species causing the conflict on your property.

Moles

Moles establish tunnels and create mounds in a way analogous to pocket gophers but with several important distinctions. First, mole mounds have a conical shape (like a volcano) whereas pocket gopher mounds have a fan or kidney shape (Fig. 3).

Second, moles create surface runs that collapse when stepped on. Pocket gophers do not. Finally, moles don't occur in Montana.

Fig. 3. Pocket gopher mound with 4½-inch knife in front.

Ground Squirrels

Pocket gophers are frequently confused with Columbian, Richardson and thirteen-lined ground squirrels. Fortunately, ground squirrel burrowing is easily distinguished from pocket gophers in that the former leave the entrances to their burrows open, while pocket gophers do not. In fact, pocket gophers monitor their burrow systems and will plug any openings they discover to prevent predators from entering.

Pocket gophers can be significant pests around the home and farm. For some, the mounds in manicured lawns detract from aesthetics of the landscape. For others, pocket gopher activities result in economic losses.

Pocket gophers damage crops and fields by directly feeding on valuable plants and by burying others with their mounds. In Montana, the crop most widely affected by pocket gophers is alfalfa. This large rooted, succulent forb often grown in better soils provides an ideal food source and habitat for pocket gophers. The diet of pocket gophers occupying an alfalfa field has been found to be over 90 percent alfalfa. This dietary preference holds even when pocket gophers reside in mixed fields.

Mounds also reduce forage production by burying plants. In moderate to dense pocket gopher populations, 10 to 20 percent of the soil surface may be covered with gopher mounds (Fig. 4). Mound soil often becomes incorporated with the alfalfa during harvest and this has been cited as increasing tooth wear of livestock eating the soil contaminated forage. In addition, the mounds provide virgin soil ready to be invaded by undesirable weedy plants.

Fig. 4. A hay field damaged by pocket gopher mounds.

The mounds of soil, also can damage harvesting equipment. The most significant damage occurs during hay harvest when cutter bars plow through mounds hidden by the surrounding alfalfa. This leads to dulling and breakdown of the harvest equipment, increasing harvest cost and time and decreasing harvest efficiency.

Production loss in alfalfa from pocket gophers sometimes goes unnoticed or is thought to be minor, because pocket gophers thin alfalfa stands rather than crop them down. While exact losses due to pocket gophers will vary on the number of pocket gophers and the value of the crop, research has shown that Northern pocket gophers can reduce forage yields by 18 to 25 percent.

Other damage from pocket gopher digging or gnawing include: washouts of irrigation ditches, loss of irrigation water, damage to

home yards and gardens, orchards, shelter belts, recreation areas and reforestation projects, and gnawing/cutting of buried pipes and cables.

CONTROL METHODS

Several control methods and strategies are available to suppress pocket gopher populations. Integration of several methods is a desirable approach for any pest problem as multiple methods often will enhance and complement other methods. With pest rodents, the choices are often dictated by the size of the area, since many techniques are not practical on large acreages.

Select control methods based on your preferences, needs, and goals. One study found that control of pocket gophers can increase alfalfa production by 18 to 28 percent. Another study found that forage yields increased by 16 percent within 60 days of control of pocket gophers. Use this economic data to help you determine when it is cost-effective for you to initiate control. Keep in mind, however, that addressing problems while they are still small is often less expensive over the long-term.

Exclusion. The use of barriers to block access by pocket gophers to sensitive areas is practical only for small plots and/or high value crops. Install a solid metal barrier or ¼-inch wire mesh 24 to 36 inches below ground with an additional 6-inch wing bent at 90° away from the area you wish to protect. The wing is to hinder the pocket gopher from trying to dig underneath the subterranean barrier. In addition, extend the barrier at least 12 inches above the soil surface to prevent pocket gophers from entering the area on the ground surface. Galvanized mesh will hold up better to weathering. Note that pocket gophers can dig deeper than 24 inches, but this barrier should manage most situations.

Protect vegetable gardens by placing ¼-inch hardware cloth below the roots in the shape of a foundation for a house. Alternatively use raised beds to prevent pocket gophers from accessing the plants.

Protect utility lines and water pipes by ensuring they are enclosed in pipes at least 2.2 inches in diameter. Pipes of this minimum diameter are too large for pocket gophers to gnaw. Alternatively, surround utility lines or pipes with a zone of one-inch crushed rock at least 6 inches wide.

Cultural and biological controls are part of an integrated approach but in themselves may not reduce damage below economic levels. Flood irrigation, however, will substantially reduce pocket gopher presence. Be prepared for pocket gophers to migrate to non-flooded areas, such as crop edges.

Frequent soil tillage or cropping practices which keep the ground free of vegetation for much of the year discourages occupation by pocket gophers. Crop edges bordering undisturbed ground may receive damage.

In pastures or rangelands managed primarily for the production of grass, reduce the food available to pocket gophers through heavy grazing or applying broadleaf herbicides.

Pocket gophers are prey for several predators, including coyotes, foxes, weasels, and owls. Badgers, snakes and hawks also make gophers part of their diet. As with most predator-prey relationships, predators only remove a portion of the prey species. Although the presence of predators should be encouraged, predators alone will seldom depress gopher populations below levels in which damage by pocket gophers is considered low.

Frightening Devices & Repellents. Frightening devices are products that use non-chemical means to keep animals away by evoking fear. Frightening devices include thumpers, windmills, ultrasound, etc. No frightening device has been found to be effective in scaring pocket gophers away from an area.

Repellents seek to stop unwanted animal behavior by means of a chemical application. Repellents include capsaicin, predator urines, putrescent eggs, etc. Though several repellents have been shown to have promise for repelling pocket gophers, these results were determined under laboratory, and not real-world conditions.

We encourage readers to be skeptical of manufacturer claims regarding the effectiveness of frightening devices or repellents. Protect yourself by only purchasing products with a solid money-back guarantee so that you can return the product if claims are not met to your satisfaction.

Lethal Control Techniques

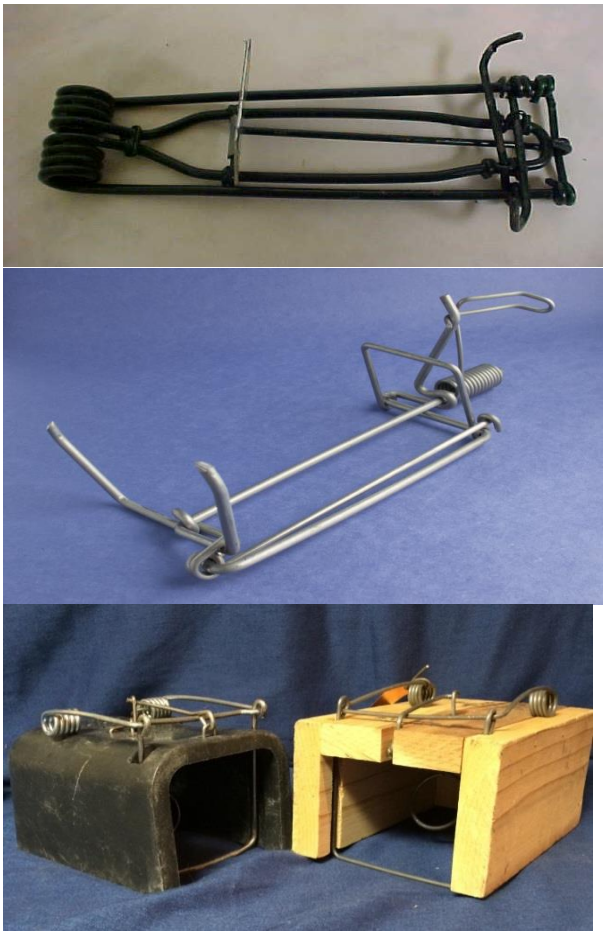
Trapping and poisoning of pocket gophers are most effective in the spring and fall when mound building is at its highest. Nevertheless, control can be initiated whenever fresh mounds are identified.

Trapping is an effective and pesticide-free method for control of pocket gophers. Trapping also is highly selective, meaning non-target animals rarely are caught with traps set for pocket gophers. Unfortunately, trapping is labor intensive and can cost almost three times more than use of toxicants. Therefore, trapping is best suited for small acreages (five acres or less) or to clean up any pocket gophers that survived an application of toxic bait.

Trapping Supplies

- Traps 1/mound
- 12-inch metal probe approximately ⅜-inch thick. Effective probes are thin and rigid. An old screw driver is perfect.
- Trapper's trowel or trenching shovel
- Roll of 18-gauge, or heavier, wire
- Surveyor flags or wooden stakes
- Knee pads and protective gloves

Various kinds of pocket gopher traps are available (Figs. 5 a, b, c) and generally one or more are carried by hardware or farm supply stores. All pocket gopher traps are effective, though some research suggests that the Gophinator (Trapline Products Menlo Park, CA) and box-style traps achieve higher capture rates. Success in trapping depends on the experience and knowledge of the user.



Figs. 5 (Top to bottom). All traps in set position. a. Macabee Gopher Trap. b. Gophinator. c. Box style traps (left to right); the Victor® Black Box Gopher Trap and The DK-2 Gopher Getter Box Trap.

Trappers have the option of placing sets in lateral tunnels or main tunnels (Fig. 6). To trap lateral tunnels, find fresh pocket gopher mounds. Fresh mounds are characterized by soil that is moister (often darker colored soil), taller, and not as compacted as the surrounding soil. Select one and position yourself on the fan side of the mound facing toward the concave side. Take your probe

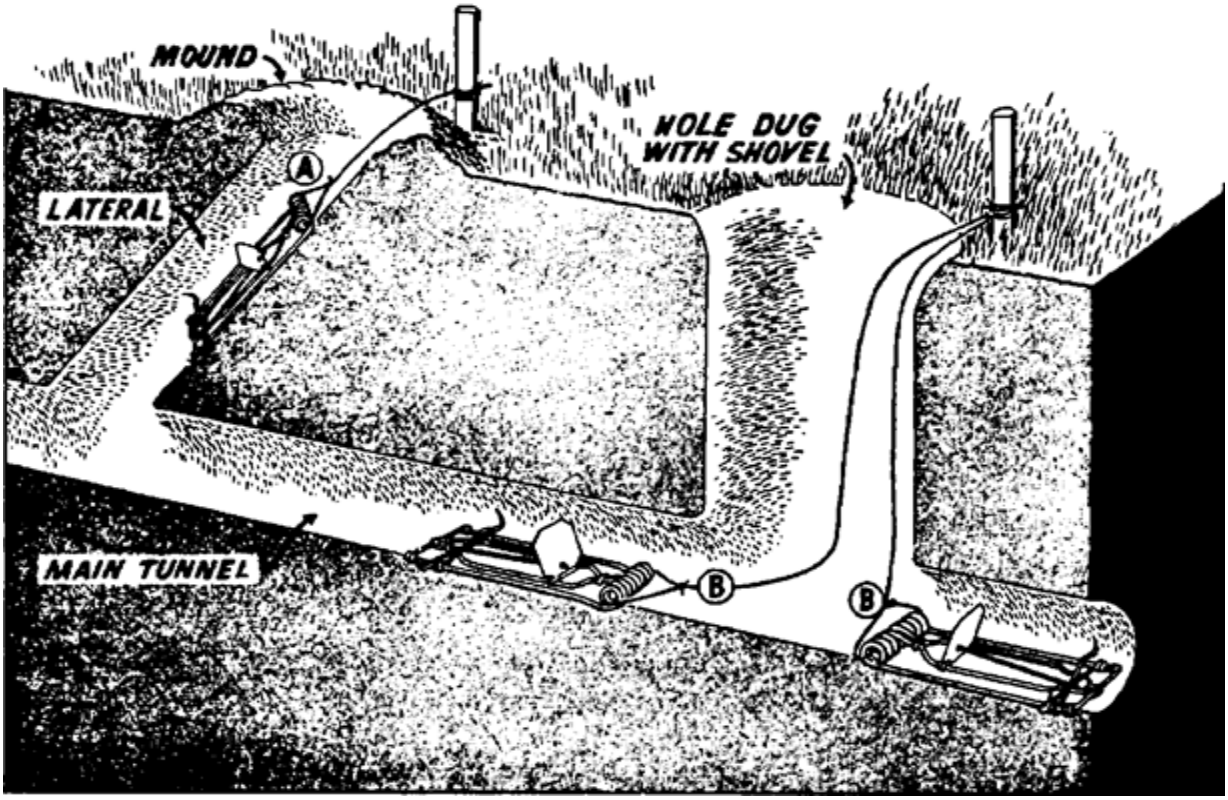


Fig. 6. Two methods of placing pocket gopher traps. A. single trap set in lateral tunnel. B. Two traps set in opposite directions in main tunnel. Use a wire to secure each trap to a stake tall enough to be seen easily.

and firmly begin to penetrate the mound at a 45° angle. Pay attention to differences in resistance. The plugged burrow will present less resistance to the probe than the undisturbed soil that surrounds it. Once you identify the spot, begin digging it out. Only make the hole big enough to fit your hand. Keep digging until you reach the main tunnel. Reach in with your hand and ensure that loose soil is not blocking the main tunnel or the lateral tunnel. Follow the manufacturer's directions for setting the traps you are using. Pincer-style traps may be inserted into the tunnel but not so far as to enter the main tunnel. You do not need to cover the hole unless you are fearful of a child or pet interacting with the trap. Likewise baits are not necessary as research suggests it does not increase trapping success enough to justify its use.

Position box-style traps over excavated holes to ensure pocket gophers do not see any light except that provided by the traps. You may need to configure holes to ensure a tight fit.

Secure all pocket gopher traps with wire connected to a surveyor's flag tall enough to ensure that you can locate the trap. Do not use string or rope as pocket gophers will gnaw through them.

Check traps daily. Move traps to new locations if you have a capture or if they are undisturbed for two days. However, if you capture a young pocket gopher or nursing female, reset the location as others may be present. Do not be surprised or discouraged if traps are frequently buried with soil. It is normal to make one capture in every three sets. Efficiency can improve with experience and training.

Follow the same process to trap the main tunnels, except that the access hole must be large enough for you to set two traps (one in each direction) in the main tunnel. (Note: box-style traps are not typically set in main tunnels). You may wish to cover the hole with a sturdy board to prevent injuries from twisted ankles by those that unknowingly step into the hole.

Use the following tips to improve the efficiency of your trapping efforts.

1. Survey the field in a grid-style manner placing flags at the fresh mounds.
2. Begin trapping in the spring to capture pocket gophers before they give birth. If the infestation is heavy, start in the fall, and control again in the spring. Additionally, some research suggests trapping in cooler weather is slightly more effective than trapping during warmer months.
3. Start trapping in the middle of the field and work toward the edges. This will remove the long-term resident pocket gophers and capture those that migrate into the field.
4. Research has shown that use of traps to maintain a 22-yard exclusion zone can capture 75 percent of the pocket gophers invading a field. Monitor exclusion zones on a weekly basis from spring through fall. You can stop when the ground is frozen. Quickly trap any pocket gophers that enter the exclusion zone.

Burrow fumigants, such as ignitable gas cartridges and aluminum phosphide tablets/pellets, are registered for the control of pocket gophers. Note that moist soil retains the toxic gases better than dry so try to plan treatments after rainfall. Do not use fumigants within 100 feet of structures to reduce risk of poisoning inhabitants and/or causing structural fires.

Ignitable gas cartridges are general use pesticides that dispense toxic gases, when the sodium/potassium nitrate, sulfur and charcoal are burned. Products may not be used in crop areas. Select pocket gopher burrows in the same manner described above for selecting trap sites. Open lateral tunnels and place a flag. Return the following day and treat burrows that have been plugged. Reopen the burrow and place the cartridge into the main tunnel. Plug the opening with soil in a manner that will prevent the cartridge from being smothered with soil. Wet conditions also reduce the risk of fires that can result from using this product. One study found a top efficacy rate of about 30 percent.

Aluminum phosphide (AP) tablets or pellets are restricted use pesticides due to the highly toxic nature of phosphine gas that is released in the presence of moisture (a tablet releases about five times as much gas as a pellet). Since phosphine gas will react to skin moisture, as well as be absorbed through the skin, always wear cotton gloves (Fig. 7). Consider wind direction when handling AP.

Fig. 7. Cotton gloves with a container of phosphine-based fumigant.

Open canisters only in well ventilated areas, such as outdoors and directed away from your face. Secure canister lids when not in use, and store in a dry area not accessible or

inhabited by humans, pets or livestock. Follow label instructions carefully. We suggest applicators begin treating fields on the downwind side and proceed to work into the wind as they progress through the field. Select burrows in the same manner as done with trapping. Probe for the main tunnel in active burrow systems. Place two to four tablets or 10 to 20 pellets into the main tunnel. Use the lower number when soils are moist and a higher number when soils are dry. Secure opening with sod plug, soil plug, or collapse hole with the heel of your shoe. Move to the next active burrow system typically 30 feet away.

NOTE: In 2012, the labels of all aluminum phosphide products underwent significant changes in regards to the fumigation of burrowing rodents. Some of these changes include:

1) Completion of a detailed written Fumigant Management Plan (FMP) is required prior to fumigation. A template for a FMP can be obtained from fumigant manufacturers or the Montana Department of Agriculture website http://agr.mt.gov/Programs/Pesticides/VertebratePest/Bulletins/.
2) Prior to applying aluminum phosphide to rodent burrows, the applicator must provide the customer with a copy of the completed FMP.
3) Aluminum phosphide fumigants use is strictly prohibited for fumigating rodent burrows on single or multi-family residential properties as well as nursing homes, schools (except athletic fields), day care facilities and hospitals.
4) Aluminum phosphide fumigants cannot be applied to a rodent burrow system that is within 100 feet of a building that is, or may be, occupied by humans and/or domestic animals.
5) A phosphine gas monitor must be used when handling and applying aluminum phosphide burrow fumigants. Ensure that exposure to phosphine gas does not exceed 0.3 ppm for the eight-hour time weighted average (TWA) or the 15 minute short term exposure limit (STEL) of 1.0 ppm. If these limits are exceeded, vacate the treated area until phosphine gas is reduced below these levels.

Other restrictions and regulations are presented in the updated aluminum phosphide labels. Be sure to read and follow the entire label, which consists of the container label and the Supplemental Applicator's Manual.

One study found that application of aluminum phosphide consumed about as much time as trapping. However, fumigation with AP achieved 84 to 100 percent reduction in pocket gophers with up to two applications.

Pressurized Exhaust Rodent Control (PERC®) uses an internal combustion engine to create carbon-monoxide which is then injected into the burrow system. Unlike gas cartridges and aluminum phosphide, the carbon-monoxide enters the burrow under pressure and does not rely on normal dispersal. A California study found that the method achieved 61 to 63 percent efficacy rate. While low, researchers found that treatment time was almost half of that required for aluminum phosphide and trapping. We encourage readers to carefully evaluate these products before purchasing.

Do not use vehicle exhaust to treat pocket gopher burrows. Modern engines burn too efficiently and likely will not be as effective.

Keep in mind that fumigation faces several challenges. First, the length and complexity of the tunnels hinders adequate dispersal of the toxic gasses. In addition, toxic gas escapes to spaces present in the soil, particularly when it is dry. Applicators may treat burrows that have been closed off by pocket gophers because it has moved on to a

new area. Also some researchers believe that pocket gophers collapse their tunnels in response to perceived threats, thereby stopping the gasses' flow. For these reasons fumigant effectiveness can vary dramatically.

Toxic baits frequently are used for pocket gopher control because they are the most cost-efficient control method. As of 2015, four active ingredients are available to Montanans for controlling pocket gophers: zinc phosphide, strychnine, chlorophacinone, and diphacinone.

Zinc phosphide and strychnine are single-dose acute toxicants. Since taste aversion can occur with pocket gophers that survive an initial encounter with these toxicants, applicators should not apply either toxicant more than once per year. Efficacy of zinc phosphide varies from 13 to 57 percent. Strychnine's efficacy can vary from 35 to 77 percent. Both active ingredients are available as general use pesticides.

The anticoagulant baits, chlorophacinone and diphacinone, require multiple feedings to kill pocket gophers. While these toxicants avoid the problem of taste aversion, the need for multiple feedings requires applicators to use more product, thereby increasing product costs. Failure to apply the anticoagulants at the recommended rates will result in lowered efficacy. Field testing found that chlorophacinone reduced pocket gopher activity by 69 to 77 percent and diphacinone by 71 percent. Both active ingredients are available as general use pesticides.

Application of baits can be made by hand or machine. [Note, however, that labels may restrict applying the pesticide by mechanical means. Read labels carefully before purchasing to ensure the pesticide can be applied in the manner you wish.]

Generally, hand baiting is used in situations involving five acres or less. There are three hand-baiting methods for applying baits:

1) The open hole technique in which bait is placed in the main tunnel by carefully removing a burrow plug and placing the bait in the tunnel with a long handled dipper or spoon. Disturb the burrow system as little as possible. Re-plug the burrow after bait placement, taking care not to cover the bait. This method is necessary when using block-style baits. Be aware that half an acre can be treated per hour when applying block-style baits.
2) 2) The hand-probe method where the bait is placed in the burrow through a probe hole. This method can treat 1½ acres in one hour. (Fig. 8).
3) 3) A bait dispenser technique in which a hand-operated mechanical probe with a bait reservoir is used to probe and dispense bait in one operation. In all three methods, each gopher burrow system should be baited at two or three locations near freshly dug mounds.

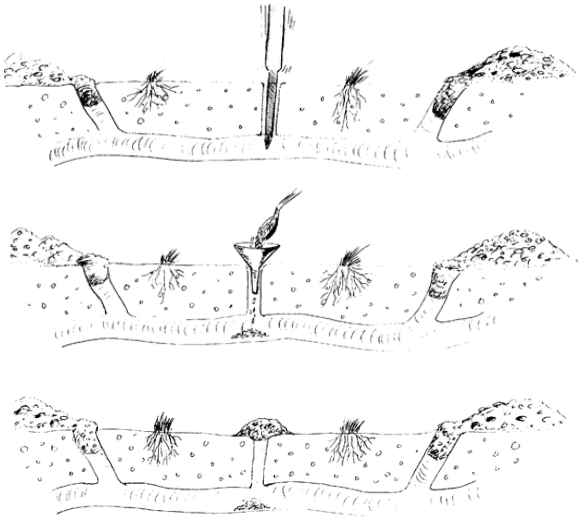


Fig. 8. Hand baiting pocket gophers. Top: Use probe to locate main borrow. Center: Place funnel in hole. Pour measured amount of grain into hole. Bottom: Place clod or sod over hole to seal opening. Do not allow loose soil to cover bait.

Mechanical burrow builders are tractor drawn devices that form an artificial burrow and deposit poison bait into the burrow in a single operation (Fig. 9). The burrow builder

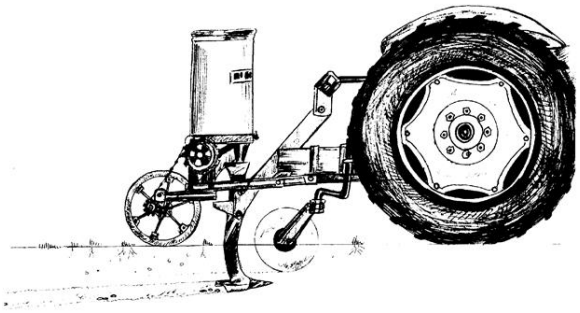


Fig. 9. A pocket gopher burrow builder. The burrow builder meters out grain bait into an artificial burrow. Pocket gophers enter the artificial burrow where it intersects the natural burrow and find the bait.

consists of several key parts: a knife-like shank and torpedo assembly which makes the artificial burrow, a coulter wheel which cuts through surface trash and roots ahead of the shank, and a packer wheel(s) which closes the furrow behind the shank. Dig out a pocket gopher burrow to determine the depth of burrow systems in your area. Then set the torpedo that forms the burrows to a depth (often between six to 12 inches) to intersect the gophers' natural burrows in your location.

Gophers quickly investigate the new burrow in their system and in the process find and eat the poison bait. Burrows should be spaced at 20 to 30 foot intervals depending on gopher density. Only those sections of a field with active pocket gophers need to be baited.

Never use burrow builders when soil is not moist enough to maintain the integrity of the created tunnel. As a rule, soil capable of being pressed into a snow ball has sufficient moisture to maintain burrow integrity. Tunnel integrity is essential to prevent cave-ins from burying the bait. Check the depth of the pocket gopher tunnels in your area. Be sure the burrow builder's tunnels will intersect those made by the pocket gophers in your landscape. Dry, sandy or rocky soils, or soils with numerous tree roots, do not form adequate burrows. Expect higher than normal wear and damage to the burrow builder in these soils. When the burrow builder is used in soil that is too wet, soil may cling to the packer wheel causing the burrow to remain open. When beginning application, and periodically during treatment, the burrow should be checked to assure a good burrow is being formed. Inspect the bait tube occasionally. It sometimes becomes plugged with soil. When the burrow builder is used in good soil and with high bait acceptance, substantial control can be expected. In many cases poor control stems from improper application.

Before using any rodenticide or any other pesticide products carefully read and understand the pesticide label. When not in use, store pesticides in their original labelled container and placed in locked storage containers.

All toxicants for pocket gophers must be placed inside the burrow system and the access point closed to prevent exposure to non-target animals. Any bait spilled on the surface should be cleaned up immediately to avoid poisoning of seed-eating birds and livestock. Intentional surface baiting for pocket gophers is ineffective and not recommended.

Avoid baiting for pocket gophers when the soil is wet or when precipitation is expected in 48 hours after application. Moisture degrades all toxic baits, and some baits will degrade very rapidly in wet conditions. Paraffin-formulated baits hold up better in moist conditions. Pelletized or grain-sized baits can be applied three times faster than block-formulated baits. Always apply fresh bait. Pocket gophers tend to avoid eating baits that are moldy or rancid. Some research suggests that toxic baits are less attractive and effective on pocket gophers in alfalfa fields.

Other Methods

Propane-oxygen devices inject a mixture of propane and oxygen into a pocket gopher burrow. The gas mixture is then detonated to

kill the pocket gopher by concussive force. In 1993, research with a propane-oxygen device obtained an efficacy rate of 12 percent.

CONCLUDING REMARKS

Landowners must have reasonable expectations for their control activities. Pocket gophers have a high reproductive rate and immigration from untreated areas can quickly replace the pocket gophers previously removed. Consistent monitoring coupled with rapid application of control methods applied in an integrated way will achieve economically beneficial results when evaluated over the long-term.

DEPARTMENT SERVICES

Rodent control will be most effective where all affected landowners work together. Montana Department of Agriculture Vertebrate Pest Specialist program will work with County Commissioners, Extension Agents, and landowners to establish a program suited to local and county needs. Field demonstrations are provided to inform landowners how, when, and where to control pocket gophers and other field rodent pests. Interested individuals should contact the Montana Department of Agriculture.

In Lewistown: Stephen M. Vantassel
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(406) 406-538-3004 svantassel@mt.gov

In Helena: Linda Johns, Program Supervisor
(406) 444-3676 ljohns@mt.gov

Additional printed information on the control of other vertebrates is available from the Montana Department of Agriculture website http://agr.mt.gov/Programs/Pesticides/VertebratePest/Bulletins/

MONTANA POISON CONTROL
(Emergencies)
1-800-222-1222

MONTANA DEPARTMENT of PUBLIC HEALTH & HUMAN SERVICES
Injury Prevention Program
1-406-444-4126
http://dphhs.mt.gov/publichealth/EMSTS/prevention.aspx

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Fig. 1. Gillian Bowser/National Park Service.
Fig. 2. J. Schmidt/National Park Service.
Figs. 3-5. Stephen M. Vantassel, Montana Department of Agriculture
Fig. 6. Adapted from E. K. Boggess (1980), "Pocket Gophers," in Handbook on Prevention and Control of Wildlife Damage, Kansas State University, Manhattan
Fig. 7. Stephen M. Vantassel, Montana Department of Agriculture
Fig. 8. Unknown
Fig. 9. Unknown

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